

Construction of Academic Atmosphere Based on the Primitive Problem-driven Teaching Mode

Hongmei Pei^{1,a,*}, Jieli Shang^{1,b} and Shuyang Li^{1,c}

¹ Department of Basis, Dalian naval Academy, Dalian, Liaoning, China

^a hongmei_005@163.com, ^b 63180583@qq.com, ^c 1463689959@qq.com

*corresponding author

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Abstract: To optimize the top-level design of mathematics teaching as a guide, aiming to promote the students' favourable academic atmosphere construction. Primitive problem-driven teaching mode is brought in mathematics teaching. Based on the analysis of the connotation of the primitive problem-driven teaching method and the basic steps of its implementation, this paper analyses the current situation of academic atmosphere of mathematics in colleges and universities, discusses the acceleration of mathematics academic atmosphere, and propose specific implement plan of primitive problem-driven teaching mode.

1. Introduction

Talent cultivation is the basic function for institutions of higher learning, of which one of the most important factors is academic atmosphere. As a permanent subject of talent cultivation, academic atmosphere construction not only relates to the image of universities themselves, but also guarantees the cultivation of high quality talents. To enhance academic atmosphere construction is an important content for the innovation and development of universities, which is the basic guarantee to improve the quality of talent cultivation.

Mathematics is the basic subject for cultivating talents in institutions of higher learning, which is so important in university career for student as it provides them with indispensable mathematical theory& calculating basis of the following courses. Based on this reason ,we bring primitive problem-driven teaching method to our teaching, to make sure mathematics curriculum teaching under the procedure of “problem, research, explore, analyze, resolve, improve”, to ensure students research in learning, and learn in researching, thus to accelerate the formation of academic atmosphere.

2. Research on Primitive Problem-driven Teaching Method

2.1. Brief Introduction on Primitive Problem-driven Teaching Method

Advanced mathematics system is established on the basis of concept definition, propositional theorem, proof derivation. When teaching advanced mathematics, it is required that we not only use knowledge and problems to drive students on the explore of mathematics, but also from the whole and the primitive, or even the level of mathematical philosophy to grasp the occurrence and development of mathematics [1]. Therefore, it is necessary to set up the old with new problems, so as to guide students' vivid learning and exploration from macro to micro, that is, to drive students' active learning with primitive problems, to accelerate the forming of excellent academic atmosphere.

2.1.1. The Meaning of “Primitive” in this Paper

In this paper, “primitive” means that in the teaching of mathematics, we put “factors” or “basic constitution” of some teaching themes as first thinking. Here “primitive” means “primitive” of teaching methods meaning, which is to say that we should consider that for student, what is the

most primitive, simple, essential concepts, ideas and methods in mathematics teaching themes, that's why it may, but not necessarily, be the "primitive problem" that promotes the progress of a branch of mathematics in the history of its development [2, 3]. In this concept, primitive problems can be generated from two aspects as follows:

One is a carefully designed problem that reflects the substance of the subject in the course of preparing for the course by the teacher.

The other one is in the classroom teaching activities, problems raised by the students involved in the subject of the essence of the key issues.

The former requires the teacher to transform substantive disciplinary issues into "teaching method", to let it be touched and understood by students step by step. The latter requires the teacher to find the primitive disciplinary issues that raised by students in the classroom which is full of uncertainty-to grasp students' thinking that reflect disciplinary essence promptly and to develop it.

2.1.2. The Meaning of "Primitive" in this Paper

Primitive problem driven teaching method is a teaching method that based on primitive problems. Unlike traditional teaching method which is learning theoretical knowledge first and solving problem later, primitive problem-driven teaching method put students first, taking the various primitive problems in the professional field as the starting point of the study, the primitive problem is the core planning and learning content, so that the students will then seek the solution around the problem, and then the learning method of the knowledge point involved in the problem is obtained [4]. In the whole process, the teacher is playing a role that ask questions, design courses, guide students to solve problems, assess the results.

2.2. Basic Steps of Primitive Problem-driven Teaching Method

2.2.1. Raise Questions

"Question" is the core of primitive problem teaching method, the teacher prepares primitive problems when preparing for courses, and raise in teaching, or the teacher may guide students to raise problems. To implement problem-driven teaching method, the teacher must be not only familiar with teaching contents, but also be familiar with students' study situations.

2.2.2. Analyse Questions

Students are the subject in the analysis of the problem. The teacher should encourage students express their views, discuss and communicate with each other actively. The teacher should pay attention to the direction and rhythm of problem discussion, which requires the teacher to control the classroom and understand the students, which is the key to the implementation of problem-driven teaching method.

2.2.3. Resolve Questions

To guide students to get the resolution based on analyze problems. Also the teacher should guide students to summarize and sublimate the method that they obtained, thus to let students to master problem analysis angle and scientific thinking method, to cultivate student's ability of analyzing problems.

2.2.4. Result Evaluation

This can be self-evaluation, group mutual evaluation or teacher evaluation. Evaluation contents can be the rationality of problem solving, the flash of thinking and so on. At the same time, the teacher can also guide students to summarize the correct methods of problem analysis and solution.

3. Analysis of Current Situation of Mathematics Academic Atmosphere of Students in Colleges and Universities

The "style of study" is described in the Modern Chinese Dictionary: school, academic or general learning. It is in the final analysis the attitude and behavior of the students to study. Mathematics as

a kind of abstract subject for cultivating logical thinking ability and putting forward the problem, analyzing the problem and solving the problem, the academic atmosphere mainly reflects the study goal, the problem consciousness, the learning method, the study interest and so on, which forms the element of the style of study at different levels.

Students' mathematics style of study, from the mainstream, is hard and solid, hard and serious, most of the students have the goal, have the plan, can reach the new outline to the knowledge and the ability requirement, but there are some problems that can not be ignored.

3.1. Lack of Goals of Learning Mathematics

Some students lack learning goals, they think it is OK to complete only the tasks that the teacher assigned to them. This requires the teacher to guide them both in and after class. Using the primitive problem to help students clarify the learning objectives of each class, while promoting the students' autonomous learning.

3.2. Lack of Consciousness of Mathematical Problems

The weakness of students' problem consciousness is manifested in three forms: one is not willing to think about problems. Inertia is relatively strong, In the class also only want to know the result of the problem, but do not care about the way to solve the problem. Second, they dare not ask questions. Students do not know the difficulty of their own problems, for fear of being laughed at by classmates and criticized by teachers. Third, unable to ask questions. This kind of students rely too much on the teacher. Although they can actively think about the problems raised by the teacher in class, they are only limited to this. They do not think and discuss the problems in a deeper way and lack the ability to raise questions.

3.3. Lack of Effective Learning Methods

Some students' learning methods are not proper, and they are not well prepared for college study psychologically and ideologically. Many students can not adapt to this kind of large capacity of teaching, can not get rid of the learning habits developed in middle school years, that is, less teaching content, more exercises in class and after class, learn a little, master a little. In addition, in addition to study and life in colleges and universities, there are physical exercise and a variety of extracurricular activities, many students do not grasp the study, life, exercise, activities in the allocation of time, affecting the study.

3.4. Lack of Interest in Mathematics

The lack of students' interest in learning is caused by a variety of reasons. In addition to the subjective factors such as unclear learning objectives and the "useless theory of mathematics", the outdated and uninnovative teaching mode is also the reason for the lack of students' interest. College mathematics education and high school have essential difference, in addition to the necessary knowledge requirements, but also need to cultivate students' mathematical thinking, problem solving ability, which puts forward higher requirements for college mathematics teaching mode.

Based on above problems, we raise primitive problem-driven teaching method. In order to clarify students on the learning aims, we designed questions before class, verify questions to many different types, such as opening questions, practice questions and so on, thus to make sure students can achieve the whole courses' target. When teaching, we create situations, reappear the process of putting forward important concepts and theorems leads the class with questions and cultivates students' problem consciousness. In class, we encourage students to raise questions, use correct thinking method to guide them effectively, to let them master correct learning method [5]. Through the integration of famous problems in the history of mathematics in the classroom, the beauty of mathematics is demonstrated and students' interest in learning is enhanced. With questions as the main line throughout the pre-class, class, after class, with questions clear learning objectives, strengthen problem awareness, understand learning methods, improve learning interest, promote the construction of a good style of learning.

4. The Implementation Scheme of Academic Atmosphere Construction Based on Primitive Problem-driven Teaching Mode

4.1. Mathematics Teaching Process Driven by Primitive Problem-driven Teaching Mode

4.1.1. The Teacher Designs Primitive Problems Pre-class to Clarify Learning Aims

The teacher designs 1 or 2 problems according to students' knowledge and teaching contents before teaching, thus to prompt students to preview, think and discuss these problems and to make clear the learning objectives of this lesson before the class. By designing primitive problems, students now can preview before class, besides, their concentration and interest in learning have been improved.

The problems can be primitive problems that related to the development of mathematics, even can be vague and simple thought, or the thinking path from unknowns to known, or students open view towards knowledge etc. Mainly have types as follows.

(1) On the Primitive of the Definition of Mathematics

For example, when learning functional limit, questions can be raised like: What is the difference between functional limit and series limit? Of all the functional limit, what is the common essence?

(2) On the Origin of propositions

For example, when learning continuous function property, question can be raised like: "function limit" property operation, why it can analogy to the "continuous function"?

(3) On the origin of mathematics method

When learning function image discussion, questions can be raised like: Is the extreme point the same as the point of inflection? How to find the maximum point? How to calculate inflection point?

(4) On the primitive of mathematics thinking

For example, when learning definite integral, questions can be raised like: How definite integral (limit form) is formed? Compared with derivative (differential), what property does definite integral have? And so on.

4.1.2. Students Preview before Class by Thinking of These Primitive Problems

Primitive problem-driven teaching method focus on students. The teacher assigns primitive problems before class, while students should cooperate with the teacher actively, to solve the problems by using the learning contents that they previewed. Considering different learning situations, the teacher may divide students into groups, every group may discuss the problems each other to try to solve the problems assigned by the teacher. Preview time is about 5-8 minutes, mainly aiming at shape an initial impression or thinking on learning contents, connect with the old knowledge in the past to absorb the knowledge learned. The teacher should encourage students to complete the problems assigned to them, at the same time, encourage students to raise a much more upper level questions. By doing this, students have an initial impression or thinking on learning contents, have questions about the content and thought of knowledge, and can arouse interest in learning and promote the cultivation of ability.

4.1.3. The Teacher and Students Cooperate with Each Other on Primitive Problems

Different students may have different answers to the same question. Sometimes some student gives a quite perfect and enlightening answer, the student himself/ herself feels quite satisfied, which prompts other students to think actively. The teacher should ask students to have a discussion on the problems, also it is OK to ask students to have a free speech. By doing this, students' thinking of mathematics can be cultivated. This design is aiming at stimulate students to think of questions from different angles, to improve their problem awareness. Whether students have a research thinking or not, whether they expressed their opinions or not is an important thing, no matter their answers right or wrong, proper or improper. What role the teacher plays is encouraging and guiding students to discuss problems, thus to create a harmonious discussion, exchange collision, mutual respect education atmosphere, to ensure that students actively participate in the discussion and positive thinking. In addition, in the course of teaching, the teacher should put

forward appropriate primitive problems at different stages to promote students mastery of different knowledge points.

4.1.4. Improve Students' Problem Awareness

Students' discussion and answer on primitive problems expose what difficulty they encountered when learning this part of contents, which also forms critical issues that need to be dealt with in the teaching process. Therefore, the teacher should adjust teaching schedule promptly according to students' feedback, which is to say, to consider how to structure definition and problems background, how to teach the contents. The teacher thus can know students' "zone of proximal development", learning difficulty, teaching key points, in order to make good arrangements for the future teaching from the level and dimension.

4.1.5. Teachers and Students Review the Primitive Problems

By the end of this class, they have completed the discussion from the whole to the part, and need to reflect and refine from the part to the whole, so as to form a richer and deeper knowledge structure, as well as the understanding of the ideological methods and models of the relevant contents. Therefore, teachers and students complete the overall understanding of the teaching content with the further understanding of the primitive problem, and at the same time, let the students learn the correct thinking method.

4.1.6. Teachers and Students "Interactive Problems" after Class

At the end of the class, students can master basic theoretical knowledge they learnt, know the knowledge essence and thinking method, forming a much richer knowledge structure. To deepen students' understanding of knowledge, the teacher may also raise a high level questions.

4.2. The Guarantee of the Construction of Academic Atmosphere Driven by the Primitive Problem--the Construction of the Style of Teaching

Teaching style refers to the long-term and stable educational and teaching atmosphere formed by educational institutions in terms of teaching spirit, teaching attitude and teaching methods. The construction of teaching style is the forerunning of the construction of learning style. The primitive problem-driven teaching mode proposed by us not only aims at students' clear learning objectives, enhancing students' interest in learning, enhancing students' awareness of problems, and promoting the construction of good learning style, but also urges teachers' construction of teaching style through this teaching mode. For primitive problem-driven teaching method, if the teacher wants to grasp primitive problem of teaching, using primitive problems to prompt students to form a good study style of learning, thinking, discussing, questioning, the first factor is positioning the teaching of a class from the dominant view of the subject (knowledge of the subject). The second factor is analyze the general thinking way or method from subject content perspective, which is front-end analysis of classroom teaching of one lesson (analytical framework for lesson preparation). Finally, use critical event analysis method to analyse class teaching. Now we preliminary obtained rational cognition as follows based on these three aspects.

4.2.1. The Teaching Goal is Designed from the Dominant Point of View of the Subject

For the researching of problem-driven teaching, the teacher's dominant view on this subject does determine the setting level of the teaching goal of this course. Some teachers only regard the goal of the class as master knowledge and skills, while some teachers allow the students to experience the essential idea of a subject via the master of knowledge and skills. Therefore, classroom teaching definitely not the list up of teaching technique, but is determined by the teacher's view of the subject on the trends of "where it comes from, where it should go to", in a brief word, "vision determines height".

In the process of primitive problem driving classroom teaching, starting from the problem, in order to solve the problem, we need to put forward more problems, calmly derived a kind of definition and theorem of the problem, finally grasped the essence to solve the problem, questioned

again after class, and solved the problem fundamentally, which reflects the essence of mathematics learning.

4.2.2. Make a Frontal Analysis from the Subject Content Angle

Firstly, apply frontal analysis into micro class teaching design. To apply frontal analysis into class teaching design can help the teacher shapes a whole thinking and structure of the teaching content. When preparing for teaching contents, some teachers are usually habitually think up of too much teaching details, materials and exercises, and then link the material with the exercises according to experience. There is just a lack of a teaching design method from the whole to the part, that is, to determine the overall teaching objectives and ideas, and then gradually refine the use of teaching materials and exercises.

Second, use study content analysis as the starting point of frontal analysis. Frontal analysis is necessary for a subject, one lecture may also use frontal analysis, which may include study needs analysis, and study content analysis and teaching object analysis. The analysis of learning needs focuses on the analysis of the gap between the actual situation of learners and the ideal of teaching, so as to determine the overall goal of learners' learning. The analysis of learning content focuses on further defining the scope and depth of learning content and revealing the connection between the components of learning content, so as to ensure the extension, connotation and depth of learning content. The analysis of teaching objects focuses on the analysis of the generality and characteristics of learners' learning characteristics, cognitive characteristics, psychological characteristics and other aspects, so as to clarify the common goals that all learners are expected to achieve in teaching and the different goals at different levels.

Third, shape a teaching design framework which is driven by subject essence problems. The above front-end analysis, which starts from the analysis of learning content, actually provides a teaching design framework which takes the essence of the subject as the breakthrough point. Someone say that compared with “how to teach it” is much more important than “what content should we learn”, to clarify “why we teach like this” is the most important thing, however, the relationship between these three factors is far from more important than which -- the lack of analysis from any Angle will lead to blind or inefficient teaching activities. It is OK that the teacher start from a learning content analysis point, stand on a basis that has a fully understanding of subject system, and then assign a series of teaching tasks.

5. Conclusion

Primitive problem-driven teaching method has a strong practice value to the construction of academic atmosphere. It has a thinking of the subject's teaching dilemma, which accelerate an excellent study style's shaping via forming a good teaching style. It is a kind of teaching style strategy, which helps students clear learning objectives and learning methods, and advocate an independent, critical thinking spirit, enhance students' awareness of problems and learning interest. The implementation of the primitive problem-driven teaching method is an important guarantee for cultivating high-quality talents and promoting the construction of a good style of study. In the process of deepening reform, innovation and development, colleges and universities must make bold innovations, integrate resources advantages, promote the construction of excellent teaching style for educators and excellent learning style for students, and provide guarantee for the construction of first-class colleges and universities.

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